

REMARKS

Claims 13-20 and 27-41 will be pending upon entry of the present amendment. Claims 13, 19, 27, 29, and 30 have been amended, and new claims 34-41 are submitted herewith.

The Examiner has rejected claims 13-18 and 27-30 under 35 U.S.C. § 102(b) as being anticipated by Chao et al. (U.S. Patent No. 5,633,535). Claims 19, 20, and 31 have been rejected under 35 U.S.C. § 103 over Chao et al. in view of Yew et al. (U.S. Patent No. 6,137,164), and claims 32 and 33 have been rejected under 35 U.S.C. § 103 over Chao et al. in view of Yew et al. and Duboz et al. (U.S. Patent No. 5,726,500).

Prior to addressing the specific rejections, applicant wishes to clarify for the Examiner a term, as used in the claims. In describing Figure 3, the specification states the following,

a spacing region 21 is present which *completely surrounds* the microstructure 29 (as is shown only for one half of the device, the other half being symmetrical to the half shown in Figure 3). The spacing region 21 moreover forms two delimiting cavities 22, inside which two plug regions 20 are present.

(emphasis added).

Referring to Figure 3, it may be seen that the microstructure 29, and the plug regions 31, are completely enclosed by the spacing region 21. Accordingly, the terms “completely surrounded,” and reference to a “cavity,” “delimiting cavity,” or “enclosed space” may be interpreted as referring to a region that is completely enclosed by the spacing region. Referring now to Figure 7, a region 47 may be seen to be at least substantially surrounded by a spacing region 39. Accordingly, use of the term “surrounding” may be interpreted as referring to a spacing region that substantially, or at least partially, surrounds a region.

Claim 13 recites, in part, “a spacing region arranged near said electrically conductive region and surrounding an active region.”

In rejecting claim 13, the Examiner cites the pedestals of Chao et al. as being analogous to the spacing region of claim 13. In particular, the Examiner refers to the text at column 4, line 33. In context, the cited text reads as follows, “It can be observed in Figure 6 that the integrated circuit 10 above the substrate 20 is a uniform controlled height 30 around the

perimeter of the chip 10. With the spacer pedestals 40, it is also possible to vary the standoff height 30 from chip to chip.” (Column 6, lines 30-35).

The text cited by the Examiner seems to be concerned only with the height of the pedestals. Applicant can find no reference in the cited text, or elsewhere in Chao et al., referring to the shape of the spacer pedestals, and certainly not teaching or suggesting a spacing region surrounding an active region. Chao indicates that the pedestals may be placed “just about anywhere that solder joints do not reside.” (Column 6, lines 1 and 2.)

Referring to the cited Figure 6, it can only be surmised that the spacer pedestals 40 are positioned to the right and left of the solder balls 43. Inasmuch as all of Chao et al.’s Figures 5-7 show cross-sectional views, there is no indication that the spacers 40 actually surround any feature. There is no clue provided to suggest the dimensions of the features in the axis perpendicular to the plane of the drawing, and so it is impossible to determine whether the solder balls are contained, even on two sides, let alone on three or four sides by the pedestals. Furthermore, Chao et al. teaches pluralities of pedestals, while claim 13 recites a spacing region that surrounds an active region. Chao shows no single pedestal surrounding, even partially, any feature.

In the absence of any indication by Chao et al. to the contrary, applicant understands the term “pedestal” to refer to a support structure, generally having a columnar shape. Certainly, none of the dictionaries consulted by the applicant includes a definition suggesting a shape configured to surround another feature. Chao et al. fails to teach a spacing region surrounding an active region, as recited in claim 13. Accordingly, claim 13, together with dependent claims 14-20, and 34-41 is allowable.

Applicant believes that claims 14 and 15 are allowable on their own merits, apart from their dependence on an allowable base claim. Claim 14 recites “wherein said electrically conductive region is of a low-melting eutectic material.”

While the Examiner has not indicated a specific structure of Chao et al. as being analogous to the conductive region of claim 14, applicant presumes that the Examiner is referring to the solder bumps of Chao et al. as being analogous to the electrically conductive region of claim 14. However, while the term “eutectic” may be defined as referring to that ratio

or blend of metals in an alloy that results in the lowest possible melting temperature, it is well known in the art that the formulation of the metals present in solder may be selected according to several criteria, only one of which is the melting temperature of the solder, other criteria being strength, conductivity, and surface tension, adhesion characteristics, etc. Furthermore, because the melting temperature of solder is often selected to be other than the lowest possible, or eutetic, temperature, it may not be assumed that the mere reference to solder is synonymous with a eutetic material. Accordingly, claim 14 is allowable over Chao et al. Claim 15 recites the eutetic material as being formed by alternating layers of gold and tin. Chao et al. fails to teach or suggest any composition for the solder recited therein, much less a material formed by alternating layers of gold and tin. Accordingly, claim 15 is allowable over the cited art.

Claim 17 recites a dielectric material "chosen from among a spun polymer, such as SU8, polyimide, a composite material formed by laminated polymer layers, such as a photosensitive stick foil, and oxynitrides." In rejecting claim 17, the Examiner cites Chao et al., column 4, lines 66-67. The cited text refers only to a photosensitive liquid film adhered to the substrate by either spraying, dipping or spinning it on. there is nothing in Chao et al. suggesting that the photosensitive liquid film is any of the materials recited in claim 17. Claim 17 is therefore allowable over the cited prior art.

Claim 27 recites, in part, "a spacer separating the first and second body... the spacer defining an enclosed space between the first and second bodies."

Chao et al. fails to teach the above-referenced limitation. Chao et al. teaches, instead, pedestals located "just about anywhere that solder joints do not reside." (Column 6, lines 1 and 2). Chao et al.'s pedestals serve only to maintain a uniform controlled height between the chip and the substrate (column 4, line 33). Certainly, given only cross sectional views and no hint of such in the text, Chao offers no teaching or suggestion to employ a spacer to define an enclosed space, as recited in claim 27. Accordingly, claim 27, together with dependent claims 28-33, is allowable over the cited prior art.

Because Chao et al. does not teach an enclosed space defined by a spacer, Chao et al. cannot suggest first and second metal regions formed within the enclosed space, as recited by claim 29, which is therefore allowable over Chao et al.

In rejecting claim 30, the Examiner has not indicated any feature of Chao et al. that he considers to be analogous to the micromechanical structure recited by claim 30. Applicant is unable to find any reference in Chao et al. to a micromechanical structure or an equivalent. Accordingly, Applicant respectfully requests the Examiner to indicate such a structure by reference numeral or passage.

Claims 31, 32, and 33 recite the first body formed of quartz, a mirror formed on a second surface of the first body, and a diffractive lens formed on the second surface of the first body, respectively.

In rejecting claims 31-33, the Examiner has cited Yew et al. as teaching the limitation of claim 31, and Duboz et al. as teaching the limitations of claims 32 and 33. However, as the Examiner has admitted, Yew et al. does not actually teach a body formed of quartz material. The Examiner merely states that it is well known in the art. Applicant respectfully disagrees, and requests that the Examiner provide a reference, or combination of references, that specifically teach this limitation, together with the limitations of the base claim.

With respect to the limitations of claims 32 and 33, the Examiner states that "Duboz et al.... describes the device further comprising a mirror formed on a second surface of the first body as part of the photosensitive element of the photodiode..., [and] further comprising a diffractive lens formed on the second surface of the first body."

Applicant has carefully examined the passages of Duboz et al. cited by the Examiner and is unable to locate any reference to either a mirror or a diffractive lens in those passages. Furthermore, applicant notes that Duboz et al.'s main substrate 30, upon which the photosensitive elements 31 are formed, is a GaAs substrate, which is not transparent. In contrast, the mirror and diffractive lens of claims 32 and 33 are formed on the quartz body of claim 31. Referring to Figure 6 of the present application, a quartz body 35 is shown, having a mirror 36 and a diffractive lens 48 formed thereon. Applicant emphasizes that Figure 6 is not the only embodiment of the invention upon which claims 31-33 read. Nevertheless, it may be seen that the quartz body 35 allows the reflection of light from the mirror 36, reflecting again within the transparent quartz body 35, to be diffracted by the lens 48. In contrast, neither Yew et al. nor Duboz et al. offer any advantages to the employment of a quartz body, nor to the formation of a

mirror or diffractive lens. For at least these reasons, each of claims 31-33 is allowable on its own merits over the cited prior art.

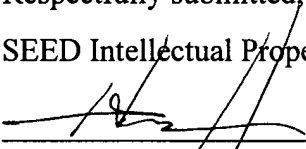
New claims 34-41 are directed to various embodiments of the invention. While the new claims vary in scope from each other, and from the other pending claims, each of the claims is allowable for at least one of the reasons cited with reference to the allowability of the previous claims.

The amendment to claim 13 is not made for the purpose of overcoming prior art, but in fact, broadens claim 13. None of the scope of claim 13, with respect to the Doctrine of Equivalents is surrendered by this Amendment. The limitation of new claim 35 is substantially similar to the limitation deleted from claim 13.

Claim 19 has been amended solely to correct a minor typographical error, which amendment bears no relation to the allowability of claim 19.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited. In the event the Examiner finds minor informalities that can be resolved by telephone conference, the Examiner is urged to contact the applicant's undersigned representative at (206) 622-4900 in order to expeditiously resolve prosecution of this application.

The Commissioner is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,
SEED Intellectual Property Law Group PLLC


Harold H. Bennett II
Registration No. 52,404

HHB:wt

Enclosure:

Postcard

701 Fifth Avenue, Suite 6300
Seattle, Washington 98104-7092
Phone: (206) 622-4900
Fax: (206) 682-6031

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